SEQUENCE LISTING

<110> Habben, Jeffrey E.
Zinselmeier, Christopher
Tomes, Dwight
Abbitt, Shane
Helentjaris, Timothy G.
Niu, Xiaomu

<120> Modulation of Cytokinin Activity in Plants

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<150> US 60/460,718
<151> 2003-04-04

<150> US 09/545,334
<151> 2000-04-07

<150> US 60/129,844
<151> 1999-04-16

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cta tca acc gga agc ggg cga cca aca gtg gaa gaa ctg aaa gga acg   857
Leu Ser Thr Gly Ser Gly Arg Pro Thr Val Glu Glu Leu Lys Gly Thr
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act cgt ctg tac ctt gat gat cgc cct ttg gta aag ggt atc att aca   905
Thr Arg Leu Tyr Leu Asp Asp Arg Pro Leu Val Lys Gly Ile Ile Thr
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Ala Lys Gln Ala His Glu Arg Leu Ile Ala Glu Val His Asn His Glu
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gcc aaa ggc ggg ctt att ctt gag gga gga tct atc tcg ttg ctc agg   1001
Ala Lys Gly Gly Leu Ile Leu Glu Gly Gly Ser Ile Ser Leu Leu Arg
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tgc atg gcg caa agt cgt tat tgg aac gcg gat ttt cgt tgg cat att   1049
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att cgc aac gag tta gca gac gag gag agc ttc atg agc gtg gcc aag   1097
Ile Arg Asn Glu Leu Ala Asp Glu Glu Ser Phe Met Ser Val Ala Lys
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acc aga gtt aag cag atg tta cgc ccc tct gca ggt ctt tct att atc   1145
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gaa ggg atc gat gga tat cga tat gcc ctg cta ttt gct acc cag aac   1241
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Gln Ile Thr Pro Asp Met Leu Leu Gln Leu Asp Ala Asp Met Glu Asn
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aaa ttg att cac ggt atc gct cag gag ttt cta atc cat gcg cgt cga   1337
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cag gaa cag aaa ttc cct ttg gtg ggc gcg aca gct gtc gaa gcg ttt   1385
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Pro Ser Ala Gly Leu Ser Ile Ile Gln Glu Leu Val Gln Leu Trp Arg
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Glu Pro Arg Leu Arg Pro Ile Leu Glu Gly Ile Asp Gly Tyr Arg Tyr
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<213> Zea mays

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gtctatacca cttcatcgat gtacgtatgc atagaaagag cacatcttat attgtggaac 780
aagaacaaaa atatggttac gccttatatt ataagacgta gaaatcaatg gtttacaata 840
gccaagaata gatgttttta tttatttcct atatagatgt ttttatttat ttcctatatg 900
tttcacaata gccttatatt gtgccgaaaa tttaggcaca cgtgccacga acgtctgaaa 960
tgtactccgc gcgtattacc atgcactacg acgtacgtag gagtatgtac gttgaaccaa 1020
gcacacatat atctctgaca cagtacaatg atatactaca acaacaacag tactgcccaa 1080

ttcatccatt ttcacgttcc atcttccgcg tgtgacaact cgatcggcca cgcacgcaga 1140
cgacgacgga gcagtacttc acagaatcct ccgccactcg tcacaccaac aggcgcgcgc 1200
tggtgcgcat gcatcatgtg catgccatcg tccgtccctt ggcgtgcctc ggtagacggt 1260
agctagagta gtagcctgtg cttgctaccc ctggtcaaca catcgtagcc tcctatattt 1320
aacgtatcct cacacatcac aagaacgaca cacagaaacc agtagccact actccatcca 1380
ccacgagcga gcgagcgata accctagcta gcttcaggat ccagcgagag ccc 1433

<210> 10
<211> 820
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(820)
<223> F3.7 promoter

<400> 10
gagctcaagc cgcaacaaca aatttcggtg ctcccaagct tcataaaggc tatcttcggc 60
gtcgttggga tccatggtgg cacagaatcg agttgatgtt gtagctggcg gctagggttt 120
gaagtggaga agaggtccgg ctggtggcat cctatcgtct attgagggtt gggtccggtg 180
gcatcatact tgatgacaat tgaaagtaat tttaatcaac ttgtcatgag tagtgagtct 240
tttataaaaa ataagctgaa ataagcaccc tttgatgagc ttataggatt atcataatct 300
caaatgctaa attatataat tttattagat aagttgcttg tttgtttccc cactagctta 360
tttacattgg attatataat ctacataaat tataatctca aacaaaaagt ccttaatcag 420
agatcagcga ggtctcacga gtgagaaggc gagagcttgt ccaaacgagc attttcgggc 480
gtgtgaacac ccatttcagc aaagccgtcg ttgtccagtt cagcgaagcg cattctgcgg 540
ctttggcgtg acccattctg ctagctcagc actgagaata cgcgtccgct gcagcgttgg 600
cgtacaggcc ggactacatt agccaacgcg tatcggcagt ggcaaacctc ttcgcttcta 660
actccgctgg gccaccagct ttgaccgccg cctcccttcc cctccgctac tgctcctccc 720
caccccactc ccccgcagga gcggcggcgg cggcggcgag gtcgtacccc acatcggcga 780
gcggcggcgg caccgccgga ggcaaaggca agtctagaac 820

<210> 11
<211> 26
<212> DNA
<213> Zea mays

<400> 11
gtcagtggtg taaaagcact tctggt 26

<210> 12
<211> 26
<212> DNA
<213> Zea mays

<400> 12
tgcgccagaa gaagcagcag gaagat 26

<210> 13
<211> 26
<212> DNA
<213> Zea mays

<400> 13
aagcttaggg tacctcaaac cggtca 26

<210> 14

<211> 34
<212> DNA
<213> Zea mays

<400> 14
ccatggtcga tatctttgca gggtagggat ctct 34

<210> 15
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Clontech AP1 primer

<400> 15
gtaatacgac tcactatagg gc 22

<210> 16
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Clontech AP2 primer

<400> 16
actatagggc acgcgtggt 19

<210> 17
<211> 1679
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(1679)
<223> tb1 promoter

<400> 17
gcggccgcct acctaataga tatgtatcac tctctcctca cttcggctat aaaagagagg 60
gatagagaaa catagaatgg gtttcgaaaa aaactctttg actctctaaa tagaaacaag 120
aggaaaggga agttagttgg tcattatctt tgttgatgcc tcaacatgta attttcttcg 180
ccattgtatt tctcaatcca ctatatacaa agaggttata gggtatatat tacacatctt 240
acggtccgaa cctatattta aattacccat gtattgatgc ctaggcggta tccagcaaca 300
gagtgtctct agcacgcatc tcttactcta tttatcaact ctcccccgaa tacatgtggt 360
tccttattgt cactggcgga tctacagggt gtcaccctgt agtccggtac cggcataaca 420
tattagcttt gtctatttca tgacttcaaa catgttgcaa caacctacag atgcgttcag 480
tctatctata tacaagagga agaatacaag tgacaaatct aatttgtgaa tataagaatt 540
attatgctgg tttacataga ataccaaatt atagcacaca tttatcattc cttattgaat 600
ttctaaatgt atttcactga attattcatg catttttaat ttggcatacc ttatagtaaa 660
attctataac cgctactgct tattgtcatt atgcgacttg gaagacattt tctacctact 720
gaaagcggtc tgtttttttgt gttgtcgaga gtgtgatggg taaccatagt taataatgca 780
ctggatctat cactactcat acaggtccca tatgcctaat aatgttgtga agaccaactc 840
atctgaccac atctgtccct accatgcttg tacaccacac tacatacatc actcatcact 900
ggtccttcgt ttcggtaccc tcctcccaca atgttcaatg tatatactaa tagttctcaa 960
ataaattcct gtggatgtta caaaaaccca cggtctttgg tttcctgaag aagtatttca 1020
tggaggcgcg cacgtccatc gtactgcgtc ctgcagctat ggccgccccc atctggccaa 1080

taaatgtact aggtcacttg tagccaatag cgtttcaaca tgcacacagc ttttccccca 1140
atagtgcagg tccttgtatt ctcctccctc tccctcacct caaatctcat ccacacgaac 1200
aggcggcacg gcagtattcc tccacagccc tcctctctat aagatggcac agccctctca 1260
ggtaggggcg agtgtctcac tctcacatag taaaaaaaaa aaaaacgccc ccaaggttct 1320
taagcacaat tctctagcta tcttggtctc ctacacagcc tatgcacatg agcccatgcc 1380
tctcctctcc ttgcgcctgc atagagaggt ggtatgatca cctggaaagt ttttaactct 1440
ctctctctct ctctctctct ctctctctta caagcctaga ccttatgcat ggtcggacgg 1500
acacatctga tcataggaca tatgagtagg ccacactcct cctgcccctc tctcgtagag 1560
atcaacacac actgctctta gtgccaggac ctagagaggg gagcgtggag agggcatcag 1620
ggggccttgg agtcccatca gtaaagcaca tgtttccttt ctgtgattcc tcaagcccc 1679

<210> 18
<211> 1027
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(1027)
<223> eep2 promoter

<400> 18
gtaaagttac aattatatat caaatgctag ctactagtcg ggagaaaacc aactaagggg 60
atgtttgttt gggattgtaa tctgtccaga atatataatc caacaaattt tgaactaaca 120
ctcggttcaa aatttattag attatataat ccatacatat tacaatccca aacaaacacc 180
cctaattcta aatggtgaga gtaaaaagcg ctgtctaata acttttatca gctaatttgt 240
ttatcttgag ctgttaatta aaccattagt gaagtttttt tgggggggtgg tcgaatagag 300
ctaatctaac tattagctca taggatcaag gccattggtt taatttcacc ccactatgac 360
tatgtcccag taactaaata ctatatttgt caccataaac tttggaagaa attagttgct 420
actagaaaga agatccaaac ctggaaaaaa ttagtttcta ctagaaagca gatcatgtct 480
gctacccaga cattgattta tactccagca tcaaccaacc ccgtacttgt tactacaaaa 540
ttggaagaaa ttagttgcta ctagaaagta gataatttct gccaccagat attgatttat 600
aacctagtat caatctctac tagccttgct tccgtcattt gttgctagat ataaatggtt 660
ttctttcaca tatgtgagtg tatatatatg aaccttgcag caaccattat attcggtagt 720
caaacaaagc cctacagaca tcgatctctg atctgagaaa aaaaatcctt atatggcgag 780
aattacaatg gaagcaagca aggctgtcct gctcttgatg gtgatcctag gaagtttgat 840
gattcccgca tactgtaagt gcacatcggg caaccatgcg catttgaatc aagttacata 900
ttatacagtt tcttactagt agtaaatata aattgttcgc ataatgtcaa caaccttaac 960
ttactgtaaa aacagtaact gaatgcccct attgcatgca gctcggaacc ttgttcgttt 1020
tctgccc 1027

<210> 19
<211> 723
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(723)
<223> trx1 or thxH promoter (thioredoxin H)

<400> 19
gcccttacta tagggcacgc gtggtcgacg gcccgggctg gtactctctg gtactgagtt 60
agatttggtg aatgttaata catatatact tttaataaaa ttacttttta agacaaaatt 120
gatgcactgg cgttcattgg cggctgtgtt aacaaaaccg aagtggaagt agcccgttcc 180
actggaggtt ggcttaagtg cacatgcagt gaaaataacg ttccacttgc gattcattta 240
acacaactgt cagtataaat agttttttt attggcggtt gatttaggtg aaccccaagc 300
gaaaatatat ttacacatgc ggtttttaa gccgtgctca cctatttatt ttcagtgtgc 360

ttaactgaaa ctgtcggtat aaatttttgc gtgccatcag tttagagcac ttatctactg 420
actttttttt tcaagtatcg tacggatttt gcaccacgtc gacgaccgtc gataacgagg 480
cacgccgatc tagagagctc gaagacctgg gaatggcaca ggggaccggc cggagcccgc 540
cggcgccatg caagctgcct cgatcgcggg cctcgaccta agtagcccgt ccctgtcgcg 600
cgccagtcgc tcgctgcgcc tataaaagcc gcccgcggct cgcgtaggct accagcgcaa 660
aactctgcca agggcttcgg atcccacacc gaggaaagga gaagagaggg tcggaatacc 720
atg 723

<210> 20
<211> 1626
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(1626)
<223> Zm40 or Mze40-2 promoter

<400> 20
aagcttagct agatcatttg taagaatgca acttgttcat atagcatggc tacagcctac 60
atcatctgaa atagacctgt ttataggata cctaagctca attcacccta tatctaaaac 120
ctacgaggcc taaacacacc cgtcctcaag aaaacgacca aaccaaacca aaccatgcgt 180
ccgtgtcatg gttttgtaga cacgtttacg tatcaattat agtgttctga ttttttatat 240
tctcctaatt atttagagct aaatttattt ttatgatagc agagatctaa atatttttgt 300
tttgattttt tatatactaa aatcatctct acaatattag agattttaaa tgctcagaag 360
aattttactt gaattaaaac ctttactgat ttttaactaa aacggagacc aaaagaaatc 420
tatccaaggc tgcctctaag agccttcgtg tctcgttttc ttatttcaga cttcactcat 480
cttcttattt caggctccac tatataaggt ggtctctagt atctttccta tcacatatcc 540
tatttaaaac tttagtatat aaaacattat aattcataat ataaatcgat tattttacac 600
gatctcagcc taaaagcggt aatatgcacg ctctgagcat ggcccaagct ccacgttaac 660
cgttctgtca aaaaaaaaaa catctagtct agaatggaaa acacacgatt ttagaagtta 720
ggactagttt ggcaactcaa ttttccaaat gattctcatt cttttaagag gatttaattt 780
atttttggt aaaataggaa tcactagaaa ctctattttt tcaagagaaa gtaagctatt 840
tttttagaaa aataaaaaat cccttaaaaa atattgttcg taaattagcc ctaagatgga 900
ctaaaaatct ggttttatag aatagggagg gatcgagcaa ccgccaaatc tacgcgccaa 960
aaaggtacct tttccgtgaa taaacacgac tgcggcgatc acgatctgat cgaactcgta 1020
gaataaaatg gagcagcgga atagtgtggg aggcacaagc acaggaggag ctgaaaccga 1080
accgaagtgg cgaacacgat ccccactccg gccggcaccc gagtgtgcga gacgtgtggg 1140
gctgatctga cgagcctgga agaagaagaa gaaaaaaaag tcctcacgct cctgcttggc 1200
tccatcgaca gctcactagc tgctaccgga tgctcgcgtc tctgatgcct ctcgattcat 1260
catccatcgt tggtggcggc ggcggggcgg caaaggttct gattccgcag cagccaagtg 1320
ctcctcctgc agacgaaaat gacggcagag gttggcgttg atccaggaga ctcatcagtt 1380
tagtttaata atgaatctgt agcaggcgct tcagtctctc atcggatgag cgagcagctt 1440
agcagagcag gtggtggtcc ctggctcgcc cccgtccatt ctttcccgcc cgtcctgccg 1500
tccactccgc cgcctattta tacccctcct cgcccaccct gccatcctca ccatcgcaat 1560
tcacaagcaa agcaatcaga gccaagcacc caccgtcctc ctttctttcc ttcgactcat 1620
caaagc 1626

<210> 21
<211> 27
<212> DNA
<213> Zea mays

<400> 21
aaacaccttc ggatattgct ccctttt 27

<210> 22
<211> 27

<212> DNA
<213> Zea mays

<400> 22
tctcgcattt gcagaaacga acaacgt 27

<210> 23
<211> 525
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(525)
<223> mLIP15

<400> 23
ctttcagcta agtccctgct ccctctcttt ttcttacatt caggtcctcg cagctcctct 60
ctttttttctt gtttctttct ttcgatctgc gagccgtcca ggtccagtac tctcctttcc 120
gtgaaggaac tcttgcagcc ggcccctctg gtttcctcga attcttgttc cccggtccct 180
cctcctgtcc ccgcgtagat ccgtccgtcc gaggagcaca ccgtccccac ccccatgttt 240
acccaccagt tcctctgacg gccgccgtgc tccgatgaag ctgagcgtgc tccgtatccg 300
ccgctcccac tccttctccg tcgccttcct ctactggttc tacgtcttct catgaacgca 360
tcgcccctct ccacctgctg atccttcgcc atctctccat ctctctttct ctctgagata 420
gtctttcgaa tccatctcta gggctcttgt ttctccccat cctcccccca ccccacccc 480
caccaaacac aagtcccctt gttcaatccg acaagacaag catcc 525

<210> 24
<211> 587
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(587)
<223> ESR promoter

<400> 24
gaattcgccc ttggtagatg tctagatgac ctattctact tttcctaaga ttttctctgt 60
atgagtaacc tgtcataatt taacttgtga gatcttgccg atataaaaaa aaaacgccag 120
tcatttatgg tacgggatta ataggttcca agaaccagcc acaatccatt tattagtttc 180
atataaatgt cataaatttt tactaaaatt ttctctgtat agtaacatgt cataactgaa 240
cttgtgagaa aaacgccagt tatttatggt acgggattaa taggttccaa aaaccagccg 300
taacctattt atattagggt actttaagct ggtgccctca gttttgttgg tgtcttcgtt 360
tttaaactta gttgtatttt ttttcttagt tctgtccttc tagtgttata gagcataagg 420
acaaaattga gcaaaaaatg actaaggata aaaatgagga tatcagaaag ggcagcagct 480
taaaaaacct tttatattag ttcaaaagga caccagtcta taaaaagtat actccaagca 540
catttgaatt tggatttgca ttgtcagtca ggccagtcaa ggggacc 587

<210> 25
<211> 900
<212> DNA
<213> Zea mays

<220>
<221> promoter
<222> (1)...(900)
<223> PCNA2 promoter

<400> 25
atcgtaatcg gttttcaccg tataccgaac cgaaaaaacc gaataccaaa ctttatcaat 60
tcccaaattt gactattcga ttatgtgaac taattgtgtg atacaattaa attgttattc 120
acttatttgt atgtgatgta tgatgtatat ctaaatattt gtacctatat aatttttact 180
ttttaaaatt atatgtaatc tatcatgtaa acttgttgta tgtattgtct tgattataag 240
tttggtattc ggtttttacc gaaaaatcga agtaaaaaac cgaaaccgaa cttctcggtt 300
tttcattttc tagaaaaccg aacggtttct aatgtttgaa aaaccgaagt tttttaaaac 360
cgaaaaaccg aaccgaagtt tagaaaaaaa ccgaatgccc agccctaaaa attagtaccc 420
cataagaact aaaaaaagat aaaatgacta aaaattaatc agttgaaacc aaacctattt 480
tcccccacac ctcacggtat tgtttcgcat tccaagtttg aaacacgact ggaaacaaaa 540
cccaaaacga ctggagggac cgagcttgtg ctgagcagca gagatggcgg gaaatgctgc 600
gtctcccgcc tcagtttcgg atgccccgcc ctttcccaaa ccggccaccg ccgccgcccg 660
tgtctcccca ccgacaggtg ggtccaatcc ttaaccacgg accagggccc ccacctgtca 720
ggtggacctt ccgaagcaag gatcggccag gcgggaaaac atttcgcggc aggtggcggt 780
tgcgccaaat ttctccctcc cttttccgtt cggcgtcccc aaacgcctcc ctattaatct 840
ccccgcgttc cccttccctc gcgccgccgc tctcccctcc caaagctcgc cccgctccca 900

<210> 26
<211> 1560
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (1)...(1560)

<400> 26
atg aag ccg cca tca ctg gtg cac tgc ttc aag ctg ctg gtc ctg ctg 48
Met Lys Pro Pro Ser Leu Val His Cys Phe Lys Leu Leu Val Leu Leu
 1   5   10   15

gcg ctc gcc agg ctg acc atg cac gtc ccc gac gag gac atg cta tcg 96
Ala Leu Ala Arg Leu Thr Met His Val Pro Asp Glu Asp Met Leu Ser
            20   25   30

ccc ctc ggc gcg ctg cgc ctc gac ggt cat ttc agc ttc cat gac gtc 144
Pro Leu Gly Ala Leu Arg Leu Asp Gly His Phe Ser Phe His Asp Val
        35   40   45

tcc gcc atg gcg cgg gac ttc ggc aac cag tgc agc ttc ctg ccg gcc 192
Ser Ala Met Ala Arg Asp Phe Gly Asn Gln Cys Ser Phe Leu Pro Ala
    50   55   60

gcc gtg ctc cac cca ggc tcg gtc tcc gat atc gcc gcc acc gtg agg 240
Ala Val Leu His Pro Gly Ser Val Ser Asp Ile Ala Ala Thr Val Arg
65   70   75   80

cac gtc ttc tcc ctg ggc gag ggc tcg ccg ctc acc gtc gcg gcg cgc 288
His Val Phe Ser Leu Gly Glu Gly Ser Pro Leu Thr Val Ala Ala Arg
                85   90   95

ggg cat gga cac tcc ctc atg ggt cag tcc cag gcc gcc cag ggg atc 336
Gly His Gly His Ser Leu Met Gly Gln Ser Gln Ala Ala Gln Gly Ile
            100   105   110

gtg gtc agg atg gag tcg ctc cgg ggc gct agg ctc cag gtc cac gac 384

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Val Val Arg Met Glu Ser Leu Arg Gly Ala Arg Leu Gln Val His Asp
        115                 120                 125

ggc ttt gtc gat gcc ccc gga gga gag ctc tgg atc aat gtc ctg cgt   432
Gly Phe Val Asp Ala Pro Gly Gly Glu Leu Trp Ile Asn Val Leu Arg
    130                 135                 140

gag acg ctg aag cac ggc ctg gca ccc aag tcg tgg acg gac tat ctc   480
Glu Thr Leu Lys His Gly Leu Ala Pro Lys Ser Trp Thr Asp Tyr Leu
145                 150                 155                 160

cat ctc acg gtc ggt ggc acc ttg tct aat gcg ggg gtc agc ggc cag   528
His Leu Thr Val Gly Gly Thr Leu Ser Asn Ala Gly Val Ser Gly Gln
                165                 170                 175

gcg ttc cgc cac gga ccg cag gtc agc aat gtc aat caa ctg gag att   576
Ala Phe Arg His Gly Pro Gln Val Ser Asn Val Asn Gln Leu Glu Ile
            180                 185                 190

gtg aca gga agg gga gac gtc gtt acc tgc tca ccc gag gat aac tct   624
Val Thr Gly Arg Gly Asp Val Val Thr Cys Ser Pro Glu Asp Asn Ser
        195                 200                 205

gat ctc ttc tat gct gct ctc ggc ggt ctt ggt cag ttc ggg atc ata   672
Asp Leu Phe Tyr Ala Ala Leu Gly Gly Leu Gly Gln Phe Gly Ile Ile
    210                 215                 220

acc aga gca agg att gca ctt gag cct gct cca gag atg gtg agg tgg   720
Thr Arg Ala Arg Ile Ala Leu Glu Pro Ala Pro Glu Met Val Arg Trp
225                 230                 235                 240

ata aga gtt ctt tac tcg gat ttt gaa agc ttc acc gaa gac cag gag   768
Ile Arg Val Leu Tyr Ser Asp Phe Glu Ser Phe Thr Glu Asp Gln Glu
                245                 250                 255

atg ttg atc atg gca gag aac tcc ttt gac tac att gaa ggt ttt gtc   816
Met Leu Ile Met Ala Glu Asn Ser Phe Asp Tyr Ile Glu Gly Phe Val
            260                 265                 270

atc ata aac agg aca ggc atc ctc aac aac tgg agg gcg tcc ttc aag   864
Ile Ile Asn Arg Thr Gly Ile Leu Asn Asn Trp Arg Ala Ser Phe Lys
        275                 280                 285

cca cag gac cca gtc caa gca agc cat ttc cag tca gat gga aga gtg   912
Pro Gln Asp Pro Val Gln Ala Ser His Phe Gln Ser Asp Gly Arg Val
    290                 295                 300

cta tac tgc ctc gaa cta acc aag aac ttc aat agt ggc gac act gat   960
Leu Tyr Cys Leu Glu Leu Thr Lys Asn Phe Asn Ser Gly Asp Thr Asp
305                 310                 315                 320

acc atg gaa cag gaa gtt gct gta ctg cta tct cgg ctt aga ttc ata  1008
Thr Met Glu Gln Glu Val Ala Val Leu Leu Ser Arg Leu Arg Phe Ile
                325                 330                 335

cag tct act cta ttc cac acc gat gtc acg tac ctg gag ttt ttg gac  1056
Gln Ser Thr Leu Phe His Thr Asp Val Thr Tyr Leu Glu Phe Leu Asp
            340                 345                 350
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agg gtg cac acc tct gag ctg aag ctg agg gca caa agc ctc tgg gaa   1104
Arg Val His Thr Ser Glu Leu Lys Leu Arg Ala Gln Ser Leu Trp Glu
        355                 360                 365

gtt cca cac cct tgg ttg aat ctt ctg ata ccg agg agc tca atc cgc   1152
Val Pro His Pro Trp Leu Asn Leu Leu Ile Pro Arg Ser Ser Ile Arg
    370                 375                 380

aga ttt gct acg gaa gtc ttt ggc agg atc ctg aaa gat agc aac aat   1200
Arg Phe Ala Thr Glu Val Phe Gly Arg Ile Leu Lys Asp Ser Asn Asn
385                 390                 395                 400

ggt cct ata ttg ctt tat cca gtg aac aaa tca aag tgg gac aac aaa   1248
Gly Pro Ile Leu Leu Tyr Pro Val Asn Lys Ser Lys Trp Asp Asn Lys
                405                 410                 415

acg tca gtg gtc ata cca gat gag gaa att ttc tac cta gtg gga ttc   1296
Thr Ser Val Val Ile Pro Asp Glu Glu Ile Phe Tyr Leu Val Gly Phe
            420                 425                 430

ctt tct tca gca ccg tct ctc tca ggt cac ggc agc att gca cat gcg   1344
Leu Ser Ser Ala Pro Ser Leu Ser Gly His Gly Ser Ile Ala His Ala
        435                 440                 445

atg agc ctg aac agc caa ata gta gag ttc tgt gaa gag gct gat att   1392
Met Ser Leu Asn Ser Gln Ile Val Glu Phe Cys Glu Glu Ala Asp Ile
    450                 455                 460

ggg atg aaa cag tat cta gca cac tac acc aca cag gag cag tgg aaa   1440
Gly Met Lys Gln Tyr Leu Ala His Tyr Thr Thr Gln Glu Gln Trp Lys
465                 470                 475                 480

acc cac ttt gga gca agg tgg gag aca ttt gaa cgg agg aaa cac aga   1488
Thr His Phe Gly Ala Arg Trp Glu Thr Phe Glu Arg Arg Lys His Arg
                485                 490                 495

tat gat ccc cta gcc atc cta gca cca gga cag aga ata ttc cca aag   1536
Tyr Asp Pro Leu Ala Ile Leu Ala Pro Gly Gln Arg Ile Phe Pro Lys
            500                 505                 510

gcg tca ctc cca ttg tct ttg tga                                  1560
Ala Ser Leu Pro Leu Ser Leu  *
        515
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<210> 27
<211> 519
<212> PRT
<213> Zea mays

<400> 27

```
Met Lys Pro Pro Ser Leu Val His Cys Phe Lys Leu Leu Val Leu Leu
 1               5                  10                  15
Ala Leu Ala Arg Leu Thr Met His Val Pro Asp Glu Asp Met Leu Ser
            20                  25                  30
Pro Leu Gly Ala Leu Arg Leu Asp Gly His Phe Ser Phe His Asp Val
        35                  40                  45
```

```
Ser Ala Met Ala Arg Asp Phe Gly Asn Gln Cys Ser Phe Leu Pro Ala
    50                  55                  60
Ala Val Leu His Pro Gly Ser Val Ser Asp Ile Ala Ala Thr Val Arg
65                  70                  75                  80
His Val Phe Ser Leu Gly Glu Gly Ser Pro Leu Thr Val Ala Ala Arg
                85                  90                  95
Gly His Gly His Ser Leu Met Gly Gln Ser Gln Ala Ala Gln Gly Ile
            100                 105                 110
Val Val Arg Met Glu Ser Leu Arg Gly Ala Arg Leu Gln Val His Asp
        115                 120                 125
Gly Phe Val Asp Ala Pro Gly Gly Glu Leu Trp Ile Asn Val Leu Arg
    130                 135                 140
Glu Thr Leu Lys His Gly Leu Ala Pro Lys Ser Trp Thr Asp Tyr Leu
145                 150                 155                 160
His Leu Thr Val Gly Gly Thr Leu Ser Asn Ala Gly Val Ser Gly Gln
                165                 170                 175
Ala Phe Arg His Gly Pro Gln Val Ser Asn Val Asn Gln Leu Glu Ile
            180                 185                 190
Val Thr Gly Arg Gly Asp Val Val Thr Cys Ser Pro Glu Asp Asn Ser
        195                 200                 205
Asp Leu Phe Tyr Ala Ala Leu Gly Gly Leu Gly Gln Phe Gly Ile Ile
    210                 215                 220
Thr Arg Ala Arg Ile Ala Leu Glu Pro Ala Pro Glu Met Val Arg Trp
225                 230                 235                 240
Ile Arg Val Leu Tyr Ser Asp Phe Glu Ser Phe Thr Glu Asp Gln Glu
                245                 250                 255
Met Leu Ile Met Ala Glu Asn Ser Phe Asp Tyr Ile Glu Gly Phe Val
            260                 265                 270
Ile Ile Asn Arg Thr Gly Ile Leu Asn Asn Trp Arg Ala Ser Phe Lys
        275                 280                 285
Pro Gln Asp Pro Val Gln Ala Ser His Phe Gln Ser Asp Gly Arg Val
    290                 295                 300
Leu Tyr Cys Leu Glu Leu Thr Lys Asn Phe Asn Ser Gly Asp Thr Asp
305                 310                 315                 320
Thr Met Glu Gln Glu Val Ala Val Leu Leu Ser Arg Leu Arg Phe Ile
                325                 330                 335
Gln Ser Thr Leu Phe His Thr Asp Val Thr Tyr Leu Glu Phe Leu Asp
            340                 345                 350
Arg Val His Thr Ser Glu Leu Lys Leu Arg Ala Gln Ser Leu Trp Glu
        355                 360                 365
Val Pro His Pro Trp Leu Asn Leu Leu Ile Pro Arg Ser Ser Ile Arg
    370                 375                 380
Arg Phe Ala Thr Glu Val Phe Gly Arg Ile Leu Lys Asp Ser Asn Asn
385                 390                 395                 400
Gly Pro Ile Leu Leu Tyr Pro Val Asn Lys Ser Lys Trp Asp Asn Lys
                405                 410                 415
Thr Ser Val Val Ile Pro Asp Glu Glu Ile Phe Tyr Leu Val Gly Phe
            420                 425                 430
Leu Ser Ser Ala Pro Ser Leu Ser Gly His Gly Ser Ile Ala His Ala
        435                 440                 445
Met Ser Leu Asn Ser Gln Ile Val Glu Phe Cys Glu Glu Ala Asp Ile
    450                 455                 460
Gly Met Lys Gln Tyr Leu Ala His Tyr Thr Thr Gln Glu Gln Trp Lys
465                 470                 475                 480
Thr His Phe Gly Ala Arg Trp Glu Thr Phe Glu Arg Arg Lys His Arg
                485                 490                 495
Tyr Asp Pro Leu Ala Ile Leu Ala Pro Gly Gln Arg Ile Phe Pro Lys
            500                 505                 510
```

```
Ala Ser Leu Pro Leu Ser Leu
        515


<210> 28
<211> 1617
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (1)...(1617)

<400> 28
atg gca aga agg act cgt ttc gtg gcc atc gcc gcc ctc ctc aca agc   48
Met Ala Arg Arg Thr Arg Phe Val Ala Ile Ala Ala Leu Leu Thr Ser
 1               5                  10                  15

ttc ctc aac gtc gca gcc ggg cat tcc cgg cca ctg tcc ggt gcc ggc   96
Phe Leu Asn Val Ala Ala Gly His Ser Arg Pro Leu Ser Gly Ala Gly
             20                  25                  30

ctc ccg ggc gat ctt ttc ggg ctg ggc atc gcg tcg agg atc cgc acg   144
Leu Pro Gly Asp Leu Phe Gly Leu Gly Ile Ala Ser Arg Ile Arg Thr
         35                  40                  45

gac agc aac tcg acg gcg aag gcg gcg acg gac ttc ggc cag atg gtg   192
Asp Ser Asn Ser Thr Ala Lys Ala Ala Thr Asp Phe Gly Gln Met Val
     50                  55                  60

agg gcc gcg ccg gag gcc gtg ttc cac ccc gcc acg ccg gcc gac atc   240
Arg Ala Ala Pro Glu Ala Val Phe His Pro Ala Thr Pro Ala Asp Ile
 65                  70                  75                  80

gcc gcg ctc gtc cgg ttc tcc gcc acg tcg gcg gcg ccg ttc ccc gtt   288
Ala Ala Leu Val Arg Phe Ser Ala Thr Ser Ala Ala Pro Phe Pro Val
                 85                  90                  95

gcg ccg cgc ggg cag ggc cac tcc tgg cgc ggc cag gcg ctc gcc ccg   336
Ala Pro Arg Gly Gln Gly His Ser Trp Arg Gly Gln Ala Leu Ala Pro
            100                 105                 110

ggc ggc gtc gtc gtg gac atg ggc tcg ctg ggg cgc ggc ccc cgc atc   384
Gly Gly Val Val Val Asp Met Gly Ser Leu Gly Arg Gly Pro Arg Ile
        115                 120                 125

aac gtg tcc gcc gtg gcc ggc gcg gag ccg ttc gtc gac gcc ggc ggg   432
Asn Val Ser Ala Val Ala Gly Ala Glu Pro Phe Val Asp Ala Gly Gly
    130                 135                 140

gag cag ctg tgg gtc gac gtc ctc cgc gcc acg ctg cga cac ggc ctg   480
Glu Gln Leu Trp Val Asp Val Leu Arg Ala Thr Leu Arg His Gly Leu
145                 150                 155                 160

gcg ccc cgc gtg tgg acc gac tac ctc cgg ctc acc gtc ggc ggc acg   528
Ala Pro Arg Val Trp Thr Asp Tyr Leu Arg Leu Thr Val Gly Gly Thr
                165                 170                 175
```

```
ctc tcc aac gcg gga atc ggc ggg cag gcg ttc cga cac ggt ccg cag   576
Leu Ser Asn Ala Gly Ile Gly Gly Gln Ala Phe Arg His Gly Pro Gln
            180                 185                 190

atc gcc aac gtg cat gaa ctc gac gtc gtc aca ggc aca ggt gag atg   624
Ile Ala Asn Val His Glu Leu Asp Val Val Thr Gly Thr Gly Glu Met
        195                 200                 205

gtg aca tgc tcc atg gac gtg aac tcg gac ctg ttc atg gcg gct cta   672
Val Thr Cys Ser Met Asp Val Asn Ser Asp Leu Phe Met Ala Ala Leu
    210                 215                 220

ggc ggg tta ggc cag ttc ggg gtc ata acc aga gca cgg atc cgg ctt   720
Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala Arg Ile Arg Leu
225                 230                 235                 240

gag ccg gcg ccc aag agg gtg cgc tgg gtt cga ctt gcc tac acc gac   768
Glu Pro Ala Pro Lys Arg Val Arg Trp Val Arg Leu Ala Tyr Thr Asp
                245                 250                 255

gtc gct act ttc acc aag gat cag gag ttt ctc ata tca aac cgg gct   816
Val Ala Thr Phe Thr Lys Asp Gln Glu Phe Leu Ile Ser Asn Arg Ala
            260                 265                 270

agc caa gtc ggg ttc gac tac gtc gaa ggc cag gtc cag ctc agc cgg   864
Ser Gln Val Gly Phe Asp Tyr Val Glu Gly Gln Val Gln Leu Ser Arg
        275                 280                 285

tcc ttg gtc gaa ggc ccc aaa tca aca ccc ttc ttc tcc ggc gcc gat   912
Ser Leu Val Glu Gly Pro Lys Ser Thr Pro Phe Phe Ser Gly Ala Asp
    290                 295                 300

gtt gct agg ctt gct gga ctc gcg tcc agg acc gga cct gct gca atc   960
Val Ala Arg Leu Ala Gly Leu Ala Ser Arg Thr Gly Pro Ala Ala Ile
305                 310                 315                 320

tac tac atc gaa ggc gcc atg tac tac acc aag gac acc gcc ata tct   1008
Tyr Tyr Ile Glu Gly Ala Met Tyr Tyr Thr Lys Asp Thr Ala Ile Ser
                325                 330                 335

gtg gac aag aaa atg aag gca ctc ctg gat cag ctg agc ttc gag cca   1056
Val Asp Lys Lys Met Lys Ala Leu Leu Asp Gln Leu Ser Phe Glu Pro
            340                 345                 350

ggg ttt gcg ttc acc aag gac gtg acg ttc gtg cag ttc ctc gat cgg   1104
Gly Phe Ala Phe Thr Lys Asp Val Thr Phe Val Gln Phe Leu Asp Arg
        355                 360                 365

gtg cgc gag gag gag agg gtg ctc cgg tca gcc ggc gcg tgg gag gtg   1152
Val Arg Glu Glu Glu Arg Val Leu Arg Ser Ala Gly Ala Trp Glu Val
    370                 375                 380

ccg cac cca tgg ctg aac ctc ttc gtc cca cgg tcg cgc atc ctc gac   1200
Pro His Pro Trp Leu Asn Leu Phe Val Pro Arg Ser Arg Ile Leu Asp
385                 390                 395                 400

ttc gac gac gga gtg ttc aag gct ctg ctc aag gac tcc aac cca gct   1248
Phe Asp Asp Gly Val Phe Lys Ala Leu Leu Lys Asp Ser Asn Pro Ala
```

```
                405                 410                 415

ggg atc atc ctc atg tac ccc atg aac aag gat agg tgg gac gac cgg   1296
Gly Ile Ile Leu Met Tyr Pro Met Asn Lys Asp Arg Trp Asp Asp Arg
            420                 425                 430

atg aca gcg atg acc cca gcc acg gac gac gac gac atg ttc tat gcc   1344
Met Thr Ala Met Thr Pro Ala Thr Asp Asp Asp Asp Met Phe Tyr Ala
        435                 440                 445

gtt agt ttc ctt tgg tca gca ctg tcc gca gac gac gtg ccc cag ctc   1392
Val Ser Phe Leu Trp Ser Ala Leu Ser Ala Asp Asp Val Pro Gln Leu
    450                 455                 460

gag aga tgg aac aag gca gtg ctg gac ttc tgt gat cgg tca gga ata   1440
Glu Arg Trp Asn Lys Ala Val Leu Asp Phe Cys Asp Arg Ser Gly Ile
465                 470                 475                 480

gaa tgc aag cag tac ctg cca cac tac aca tct caa gac ggg tgg cga   1488
Glu Cys Lys Gln Tyr Leu Pro His Tyr Thr Ser Gln Asp Gly Trp Arg
                485                 490                 495

cgg cat ttc ggg gcg aaa tgg agc agg atc gct gag ctg aag gcc aga   1536
Arg His Phe Gly Ala Lys Trp Ser Arg Ile Ala Glu Leu Lys Ala Arg
            500                 505                 510

tat gac cct cgg gca ttg ttg tcg ccg ggc cag agg att ttt ccg gtg   1584
Tyr Asp Pro Arg Ala Leu Leu Ser Pro Gly Gln Arg Ile Phe Pro Val
        515                 520                 525

cca gta gag gca tct ggc att gct tct gcc tga                       1617
Pro Val Glu Ala Ser Gly Ile Ala Ser Ala  *
    530                 535
```

<210> 29
<211> 538
<212> PRT
<213> Zea mays

<400> 29

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Met Ala Arg Arg Thr Arg Phe Val Ala Ile Ala Ala Leu Leu Thr Ser
 1               5                  10                  15
Phe Leu Asn Val Ala Ala Gly His Ser Arg Pro Leu Ser Gly Ala Gly
            20                  25                  30
Leu Pro Gly Asp Leu Phe Gly Leu Gly Ile Ala Ser Arg Ile Arg Thr
        35                  40                  45
Asp Ser Asn Ser Thr Ala Lys Ala Ala Thr Asp Phe Gly Gln Met Val
    50                  55                  60
Arg Ala Ala Pro Glu Ala Val Phe His Pro Ala Thr Pro Ala Asp Ile
65                  70                  75                  80
Ala Ala Leu Val Arg Phe Ser Ala Thr Ser Ala Ala Pro Phe Pro Val
                85                  90                  95
Ala Pro Arg Gly Gln Gly His Ser Trp Arg Gly Gln Ala Leu Ala Pro
            100                 105                 110
Gly Gly Val Val Val Asp Met Gly Ser Leu Gly Arg Gly Pro Arg Ile
        115                 120                 125
Asn Val Ser Ala Val Ala Gly Ala Glu Pro Phe Val Asp Ala Gly Gly
```

```
    130                 135                 140
Glu Gln Leu Trp Val Asp Val Leu Arg Ala Thr Leu Arg His Gly Leu
145                 150                 155                 160
Ala Pro Arg Val Trp Thr Asp Tyr Leu Arg Leu Thr Val Gly Gly Thr
                165                 170                 175
Leu Ser Asn Ala Gly Ile Gly Gly Gln Ala Phe Arg His Gly Pro Gln
            180                 185                 190
Ile Ala Asn Val His Glu Leu Asp Val Val Thr Gly Thr Gly Glu Met
        195                 200                 205
Val Thr Cys Ser Met Asp Val Asn Ser Asp Leu Phe Met Ala Ala Leu
    210                 215                 220
Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala Arg Ile Arg Leu
225                 230                 235                 240
Glu Pro Ala Pro Lys Arg Val Arg Trp Val Arg Leu Ala Tyr Thr Asp
                245                 250                 255
Val Ala Thr Phe Thr Lys Asp Gln Glu Phe Leu Ile Ser Asn Arg Ala
            260                 265                 270
Ser Gln Val Gly Phe Asp Tyr Val Glu Gly Gln Val Gln Leu Ser Arg
        275                 280                 285
Ser Leu Val Glu Gly Pro Lys Ser Thr Pro Phe Phe Ser Gly Ala Asp
    290                 295                 300
Val Ala Arg Leu Ala Gly Leu Ala Ser Arg Thr Gly Pro Ala Ala Ile
305                 310                 315                 320
Tyr Tyr Ile Glu Gly Ala Met Tyr Tyr Thr Lys Asp Thr Ala Ile Ser
                325                 330                 335
Val Asp Lys Lys Met Lys Ala Leu Leu Asp Gln Leu Ser Phe Glu Pro
            340                 345                 350
Gly Phe Ala Phe Thr Lys Asp Val Thr Phe Val Gln Phe Leu Asp Arg
        355                 360                 365
Val Arg Glu Glu Glu Arg Val Leu Arg Ser Ala Gly Ala Trp Glu Val
    370                 375                 380
Pro His Pro Trp Leu Asn Leu Phe Val Pro Arg Ser Arg Ile Leu Asp
385                 390                 395                 400
Phe Asp Asp Gly Val Phe Lys Ala Leu Leu Lys Asp Ser Asn Pro Ala
                405                 410                 415
Gly Ile Ile Leu Met Tyr Pro Met Asn Lys Asp Arg Trp Asp Asp Arg
            420                 425                 430
Met Thr Ala Met Thr Pro Ala Thr Asp Asp Asp Asp Met Phe Tyr Ala
        435                 440                 445
Val Ser Phe Leu Trp Ser Ala Leu Ser Ala Asp Asp Val Pro Gln Leu
    450                 455                 460
Glu Arg Trp Asn Lys Ala Val Leu Asp Phe Cys Asp Arg Ser Gly Ile
465                 470                 475                 480
Glu Cys Lys Gln Tyr Leu Pro His Tyr Thr Ser Gln Asp Gly Trp Arg
                485                 490                 495
Arg His Phe Gly Ala Lys Trp Ser Arg Ile Ala Glu Leu Lys Ala Arg
            500                 505                 510
Tyr Asp Pro Arg Ala Leu Leu Ser Pro Gly Gln Arg Ile Phe Pro Val
        515                 520                 525
Pro Val Glu Ala Ser Gly Ile Ala Ser Ala
    530                 535
```

<210> 30
<211> 1566
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (1)...(1566)

<400> 30
atg atg ctc gcg tac atg gac cgc gcg acg gcg gcc gcc gag cca gag 48
Met Met Leu Ala Tyr Met Asp Arg Ala Thr Ala Ala Ala Glu Pro Glu
 1   5   10   15

gac gcc ggc cgc gag ccc gcc acc atg gcg ggc ggg tgc gcg gcg gcg 96
Asp Ala Gly Arg Glu Pro Ala Thr Met Ala Gly Gly Cys Ala Ala Ala
             20   25   30

gcg acg gat ttc ggc ggg ctg ggg agc gcc atg ccc gcg gcc gtg gtc 144
Ala Thr Asp Phe Gly Gly Leu Gly Ser Ala Met Pro Ala Ala Val Val
         35   40   45

cgc ccg gcg agc gcg gac gac gtg gcc agc gcc atc cgc gcg gcg gcg 192
Arg Pro Ala Ser Ala Asp Asp Val Ala Ser Ala Ile Arg Ala Ala Ala
     50   55   60

ctg acg ccg cac ctc acc gtg gcc gcc cgc ggg aac ggg cac tcg gtg 240
Leu Thr Pro His Leu Thr Val Ala Ala Arg Gly Asn Gly His Ser Val
 65   70   75   80

gcc ggc cag gcc atg gcc gag ggc ggg ctg gtc ctc gac atg cgc tcg 288
Ala Gly Gln Ala Met Ala Glu Gly Gly Leu Val Leu Asp Met Arg Ser
                 85   90   95

ctc gcg gcg ccg tcc cgg cgc gcg cag atg cag ctc gtc gtg cag tgc 336
Leu Ala Ala Pro Ser Arg Arg Ala Gln Met Gln Leu Val Val Gln Cys
            100   105   110

ccc gac ggc ggc ggc ggc cgc cgc tgc ttc gcc gac gtc ccc ggc ggc 384
Pro Asp Gly Gly Gly Gly Arg Arg Cys Phe Ala Asp Val Pro Gly Gly
        115   120   125

gcg ctc tgg gag gag gtg ctc cac tgg gcc gtc gac aac cac ggg ctc 432
Ala Leu Trp Glu Glu Val Leu His Trp Ala Val Asp Asn His Gly Leu
    130   135   140

gcc ccg gcg tcc tgg acg gac tac ctc cgc ctc acc gtg ggc ggc acg 480
Ala Pro Ala Ser Trp Thr Asp Tyr Leu Arg Leu Thr Val Gly Gly Thr
145   150   155   160

ctc tcc aat ggc ggc gtc agc ggc cag tcc ttc cgc tac ggg ccc cag 528
Leu Ser Asn Gly Gly Val Ser Gly Gln Ser Phe Arg Tyr Gly Pro Gln
                165   170   175

gtg tcc aac gtg gcc gag ctc gag gtg gtc acc ggc gac ggc gag cgc 576
Val Ser Asn Val Ala Glu Leu Glu Val Val Thr Gly Asp Gly Glu Arg
            180   185   190

cgc gtc tgc tcg ccc tcc tcc cac ccg gac ctc ttc ttc gcc gtg ctc 624
Arg Val Cys Ser Pro Ser Ser His Pro Asp Leu Phe Phe Ala Val Leu
        195   200   205

ggc ggg ctc ggc cag ttt ggc gtc atc acg cgc gcc cgc atc ccg ctc 672

```
Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala Arg Ile Pro Leu
    210                 215                 220

cac agg gcg ccc aag gcg gtg cgg tgg acg cgc gtg gtg tac gcg agc   720
His Arg Ala Pro Lys Ala Val Arg Trp Thr Arg Val Val Tyr Ala Ser
225                 230                 235                 240

atc gcg gac tac acg gcg gac gcg gag tgg ctg gtg acg cgg ccc ccc   768
Ile Ala Asp Tyr Thr Ala Asp Ala Glu Trp Leu Val Thr Arg Pro Pro
                245                 250                 255

gac gcg gcg ttc gac tac gtg gag ggc ttc gcg ttc gtg aac agc gac   816
Asp Ala Ala Phe Asp Tyr Val Glu Gly Phe Ala Phe Val Asn Ser Asp
            260                 265                 270

gac ccc gtg aac ggc tgg ccg tcc gtg ccc atc ccc ggc ggc gcc cgc   864
Asp Pro Val Asn Gly Trp Pro Ser Val Pro Ile Pro Gly Gly Ala Arg
        275                 280                 285

ttc gac ccg tcc ctc ctc ccc gcc ggc gcc ggc ccc gtc ctc tac tgc   912
Phe Asp Pro Ser Leu Leu Pro Ala Gly Ala Gly Pro Val Leu Tyr Cys
    290                 295                 300

ctg gag gtg gcc ctg tac cag tac gcg cac cgg ccc gac gac gac gac   960
Leu Glu Val Ala Leu Tyr Gln Tyr Ala His Arg Pro Asp Asp Asp Asp
305                 310                 315                 320

gag gag gac cag gcg gcg gtg acc gtg agc cgg atg atg gcg ccg ctc   1008
Glu Glu Asp Gln Ala Ala Val Thr Val Ser Arg Met Met Ala Pro Leu
                325                 330                 335

aag cac gtg cgg ggc ctg gag ttc gcg gcg gac gtc ggg tac gtg gac   1056
Lys His Val Arg Gly Leu Glu Phe Ala Ala Asp Val Gly Tyr Val Asp
            340                 345                 350

ttc ctg tcc cgc gtg aac cgg gtg gag gag gag gcc cgg cgc aac ggc   1104
Phe Leu Ser Arg Val Asn Arg Val Glu Glu Glu Ala Arg Arg Asn Gly
        355                 360                 365

agc tgg gac gcg ccg cac ccg tgg ctc aac ctc ttc gtc tcc gcg cgc   1152
Ser Trp Asp Ala Pro His Pro Trp Leu Asn Leu Phe Val Ser Ala Arg
    370                 375                 380

gac atc gcc gac ttc gac cgc gcc gtc atc aag ggc atg ctc gcc gac   1200
Asp Ile Ala Asp Phe Asp Arg Ala Val Ile Lys Gly Met Leu Ala Asp
385                 390                 395                 400

ggc atc gac ggg ccc atg ctc gtc tac cct atg ctc aag agc aag tgg   1248
Gly Ile Asp Gly Pro Met Leu Val Tyr Pro Met Leu Lys Ser Lys Trp
                405                 410                 415

gac ccc aac acg tcg gtg gcg ctg ccg gag ggc gag gtc ttc tac ctg   1296
Asp Pro Asn Thr Ser Val Ala Leu Pro Glu Gly Glu Val Phe Tyr Leu
            420                 425                 430

gtg gcg ctg ctg cgg ttc tgc cgg agc ggc ggg ccg gcg gtg gac gag   1344
Val Ala Leu Leu Arg Phe Cys Arg Ser Gly Gly Pro Ala Val Asp Glu
        435                 440                 445
```

```
ctg gtg gcg cag aac ggc gcc atc ctc cgc gcc tgc cgc gcc aac ggc   1392
Leu Val Ala Gln Asn Gly Ala Ile Leu Arg Ala Cys Arg Ala Asn Gly
    450                 455                 460

tac gac tac aag gcc tac ttc ccg agc tac cgc ggc gag gcc gac tgg   1440
Tyr Asp Tyr Lys Ala Tyr Phe Pro Ser Tyr Arg Gly Glu Ala Asp Trp
465                 470                 475                 480

gcg cgc cac ttc ggc gcc gcc agg tgg agg cgc ttc gtg gac cgc aag   1488
Ala Arg His Phe Gly Ala Ala Arg Trp Arg Arg Phe Val Asp Arg Lys
                485                 490                 495

gcc cgg tac gac ccg ctg gcg atc ctc gcg ccg ggc cag aag atc ttc   1536
Ala Arg Tyr Asp Pro Leu Ala Ile Leu Ala Pro Gly Gln Lys Ile Phe
            500                 505                 510

cct cgg gtc ccg gcg tcc gtc gcc gtg tag                           1566
Pro Arg Val Pro Ala Ser Val Ala Val  *
        515                 520
```

<210> 31
<211> 521
<212> PRT
<213> Zea mays

<400> 31

```
Met Met Leu Ala Tyr Met Asp Arg Ala Thr Ala Ala Ala Glu Pro Glu
 1               5                  10                  15
Asp Ala Gly Arg Glu Pro Ala Thr Met Ala Gly Gly Cys Ala Ala Ala
            20                  25                  30
Ala Thr Asp Phe Gly Gly Leu Gly Ser Ala Met Pro Ala Ala Val Val
        35                  40                  45
Arg Pro Ala Ser Ala Asp Asp Val Ala Ser Ala Ile Arg Ala Ala Ala
    50                  55                  60
Leu Thr Pro His Leu Thr Val Ala Ala Arg Gly Asn Gly His Ser Val
65                  70                  75                  80
Ala Gly Gln Ala Met Ala Glu Gly Gly Leu Val Leu Asp Met Arg Ser
                85                  90                  95
Leu Ala Ala Pro Ser Arg Arg Ala Gln Met Gln Leu Val Val Gln Cys
            100                 105                 110
Pro Asp Gly Gly Gly Gly Arg Arg Cys Phe Ala Asp Val Pro Gly Gly
        115                 120                 125
Ala Leu Trp Glu Glu Val Leu His Trp Ala Val Asp Asn His Gly Leu
    130                 135                 140
Ala Pro Ala Ser Trp Thr Asp Tyr Leu Arg Leu Thr Val Gly Gly Thr
145                 150                 155                 160
Leu Ser Asn Gly Gly Val Ser Gly Gln Ser Phe Arg Tyr Gly Pro Gln
                165                 170                 175
Val Ser Asn Val Ala Glu Leu Glu Val Val Thr Gly Asp Gly Glu Arg
            180                 185                 190
Arg Val Cys Ser Pro Ser Ser His Pro Asp Leu Phe Phe Ala Val Leu
        195                 200                 205
Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala Arg Ile Pro Leu
    210                 215                 220
His Arg Ala Pro Lys Ala Val Arg Trp Thr Arg Val Val Tyr Ala Ser
225                 230                 235                 240
```

```
Ile Ala Asp Tyr Thr Ala Asp Ala Glu Trp Leu Val Thr Arg Pro Pro
                245                 250                 255
Asp Ala Ala Phe Asp Tyr Val Glu Gly Phe Ala Phe Val Asn Ser Asp
            260                 265                 270
Asp Pro Val Asn Gly Trp Pro Ser Val Pro Ile Pro Gly Gly Ala Arg
        275                 280                 285
Phe Asp Pro Ser Leu Leu Pro Ala Gly Ala Gly Pro Val Leu Tyr Cys
    290                 295                 300
Leu Glu Val Ala Leu Tyr Gln Tyr Ala His Arg Pro Asp Asp Asp Asp
305                 310                 315                 320
Glu Glu Asp Gln Ala Ala Val Thr Val Ser Arg Met Met Ala Pro Leu
                325                 330                 335
Lys His Val Arg Gly Leu Glu Phe Ala Ala Asp Val Gly Tyr Val Asp
            340                 345                 350
Phe Leu Ser Arg Val Asn Arg Val Glu Glu Glu Ala Arg Arg Asn Gly
        355                 360                 365
Ser Trp Asp Ala Pro His Pro Trp Leu Asn Leu Phe Val Ser Ala Arg
    370                 375                 380
Asp Ile Ala Asp Phe Asp Arg Ala Val Ile Lys Gly Met Leu Ala Asp
385                 390                 395                 400
Gly Ile Asp Gly Pro Met Leu Val Tyr Pro Met Leu Lys Ser Lys Trp
                405                 410                 415
Asp Pro Asn Thr Ser Val Ala Leu Pro Glu Gly Glu Val Phe Tyr Leu
            420                 425                 430
Val Ala Leu Leu Arg Phe Cys Arg Ser Gly Gly Pro Ala Val Asp Glu
        435                 440                 445
Leu Val Ala Gln Asn Gly Ala Ile Leu Arg Ala Cys Arg Ala Asn Gly
    450                 455                 460
Tyr Asp Tyr Lys Ala Tyr Phe Pro Ser Tyr Arg Gly Glu Ala Asp Trp
465                 470                 475                 480
Ala Arg His Phe Gly Ala Ala Arg Trp Arg Arg Phe Val Asp Arg Lys
                485                 490                 495
Ala Arg Tyr Asp Pro Leu Ala Ile Leu Ala Pro Gly Gln Lys Ile Phe
            500                 505                 510
Pro Arg Val Pro Ala Ser Val Ala Val
        515                 520
```

<210> 32
<211> 1629
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (1)...(1629)

<400> 32

```
atg gag gtt gcc atg gtc gtg agc gca aga gcc agc ctg ctg atc ctc   48
Met Glu Val Ala Met Val Val Ser Ala Arg Ala Ser Leu Leu Ile Leu
 1               5                  10                  15

gtc ctc tcc ctc tgc tct ccg tac aaa ttc ata cag agc ccc atg gac   96
Val Leu Ser Leu Cys Ser Pro Tyr Lys Phe Ile Gln Ser Pro Met Asp
            20                  25                  30

ctg ggc ccc ctg aac ctg ctc ccc acc acc agc acc gcg gcc gcg tcc   144
Leu Gly Pro Leu Asn Leu Leu Pro Thr Thr Ser Thr Ala Ala Ala Ser
```

```
         35                  40                  45

agc gac ttc ggc agg ata ctc ttc cgc gcc ccg gcc gcg gtg ctg agg   192
Ser Asp Phe Gly Arg Ile Leu Phe Arg Ala Pro Ala Ala Val Leu Arg
     50                  55                  60

ccc cag tcg ccg agg gac atc tcc atg ctg ctc agc ttc ctc tcc ggc   240
Pro Gln Ser Pro Arg Asp Ile Ser Met Leu Leu Ser Phe Leu Ser Gly
 65                  70                  75                  80

tcg ccc tcg ctg agc agg gtc acg gtg gcg gcc agg ggg gca ggc cac   288
Ser Pro Ser Leu Ser Arg Val Thr Val Ala Ala Arg Gly Ala Gly His
                 85                  90                  95

tcc atc cac ggg cag gcg cag gcc ccg gac ggc att gtg gtg gag acg   336
Ser Ile His Gly Gln Ala Gln Ala Pro Asp Gly Ile Val Val Glu Thr
            100                 105                 110

cgc tcc ttg ccc ggc gag atg gag ttc cac cac gtc cgc ggg gga ggc   384
Arg Ser Leu Pro Gly Glu Met Glu Phe His His Val Arg Gly Gly Gly
        115                 120                 125

gaa ggg cgt gcc tcc tac gcc gac gtg ggc ggc ggg gtt ctg tgg atc   432
Glu Gly Arg Ala Ser Tyr Ala Asp Val Gly Gly Gly Val Leu Trp Ile
    130                 135                 140

gag ctc ctg gag cgg agc ctg aag ctt ggg ctg gct ccc agg tcc tgg   480
Glu Leu Leu Glu Arg Ser Leu Lys Leu Gly Leu Ala Pro Arg Ser Trp
145                 150                 155                 160

acc gac tac ctc tac ctc act gtc ggc ggg acg ctg tcc aat gcc ggc   528
Thr Asp Tyr Leu Tyr Leu Thr Val Gly Gly Thr Leu Ser Asn Ala Gly
                165                 170                 175

atc agc ggg cag acg ttc aag cac ggg cca cag atc agc aac gtc ctc   576
Ile Ser Gly Gln Thr Phe Lys His Gly Pro Gln Ile Ser Asn Val Leu
            180                 185                 190

cag ctg gag gta gtc aca gga cga ggg gag att gtg gaa tgc tca ccc   624
Gln Leu Glu Val Val Thr Gly Arg Gly Glu Ile Val Glu Cys Ser Pro
        195                 200                 205

agc aag gag gcc gac ctg ttc aat gcc gtc ctg gga ggc cta ggc cag   672
Ser Lys Glu Ala Asp Leu Phe Asn Ala Val Leu Gly Gly Leu Gly Gln
    210                 215                 220

ttc ggc atc ata acc agg gcc agg atc ctg ctg cag gag gct ccg gag   720
Phe Gly Ile Ile Thr Arg Ala Arg Ile Leu Leu Gln Glu Ala Pro Glu
225                 230                 235                 240

aag gtg acg tgg gtg agg gcc ttc tac gac gac ttg ggc gcc ttc acc   768
Lys Val Thr Trp Val Arg Ala Phe Tyr Asp Asp Leu Gly Ala Phe Thr
                245                 250                 255

agg gac cag gag ctg ctg gtg tcg att ccg gat tcg gtg gac tac gtg   816
Arg Asp Gln Glu Leu Leu Val Ser Ile Pro Asp Ser Val Asp Tyr Val
            260                 265                 270
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gaa ggg ttc atg gtc ctg aac gag cgg tcc ctc cac agc tcc tcc atc   864
Glu Gly Phe Met Val Leu Asn Glu Arg Ser Leu His Ser Ser Ser Ile
        275                 280                 285

gcc ttc ccc gcg agc gtg gac ttc agc ccg gat ttc ggc acc agg agc   912
Ala Phe Pro Ala Ser Val Asp Phe Ser Pro Asp Phe Gly Thr Arg Ser
    290                 295                 300

agc cct agg atc tac tac tgc gtc gag ttc gcg gtc cac cac cac cac   960
Ser Pro Arg Ile Tyr Tyr Cys Val Glu Phe Ala Val His His His His
305                 310                 315                 320

ggt tac cag cag cag tct cag gcg gcc gtg gag gcc atc tcg agg cgg   1008
Gly Tyr Gln Gln Gln Ser Gln Ala Ala Val Glu Ala Ile Ser Arg Arg
                325                 330                 335

atg agc cac atg gcg tcc cag ctg tac agc gtg gag gtg tcc tac ttg   1056
Met Ser His Met Ala Ser Gln Leu Tyr Ser Val Glu Val Ser Tyr Leu
            340                 345                 350

gac ttc ctg aac cgg gtc agg atg gag gag gtg agc ctg cgg agc gcc   1104
Asp Phe Leu Asn Arg Val Arg Met Glu Glu Val Ser Leu Arg Ser Ala
        355                 360                 365

ggg atg tgg gag gag gtg cac cac ccg tgg ctc aac atg ttc gtg ccc   1152
Gly Met Trp Glu Glu Val His His Pro Trp Leu Asn Met Phe Val Pro
    370                 375                 380

aag gcc ggg gtc gct ggc ttc agg gat ctg ctc atg gac aac gtc tcg   1200
Lys Ala Gly Val Ala Gly Phe Arg Asp Leu Leu Met Asp Asn Val Ser
385                 390                 395                 400

ccg gat agc ttc cag ggc ctc atc ctc atc tac cca ctc ctc aga gac   1248
Pro Asp Ser Phe Gln Gly Leu Ile Leu Ile Tyr Pro Leu Leu Arg Asp
                405                 410                 415

aag tgg gac acc aac acg tcg gtc gtg atc ccg gac tcc ggg ccc acc   1296
Lys Trp Asp Thr Asn Thr Ser Val Val Ile Pro Asp Ser Gly Pro Thr
            420                 425                 430

gcg gac gac ccg gtg atg tac gtg gtc ggc atc ctc agg tcc gcg aac   1344
Ala Asp Asp Pro Val Met Tyr Val Val Gly Ile Leu Arg Ser Ala Asn
        435                 440                 445

cct ggt cca gaa gaa gac ggt gac ggc tgc tcc cac cgc tgc ctg cac   1392
Pro Gly Pro Glu Glu Asp Gly Asp Gly Cys Ser His Arg Cys Leu His
    450                 455                 460

gag ctc ctc cgc agc cac cgc cgg atc gcc gac gcc gcg gag gcg cgc   1440
Glu Leu Leu Arg Ser His Arg Arg Ile Ala Asp Ala Ala Glu Ala Arg
465                 470                 475                 480

ctc ggc gcc aag cag tac ctg cct cac cac ccg acc ccg gcc cgc tgg   1488
Leu Gly Ala Lys Gln Tyr Leu Pro His His Pro Thr Pro Ala Arg Trp
                485                 490                 495

cag cag cac ctg ggc cgg cgc tgg gag cgc ttc gcg gac cgc aag gcc   1536
Gln Gln His Leu Gly Arg Arg Trp Glu Arg Phe Ala Asp Arg Lys Ala
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```
            500                 505                 510

cgg ttc gac ccg ctg cgc atc ctg ggg ccc ggc cag ggc ata ttc cct   1584
Arg Phe Asp Pro Leu Arg Ile Leu Gly Pro Gly Gln Gly Ile Phe Pro
        515                 520                 525

cgg acg gcc cag gat gct gcc gcc gct gct gcg tac ggg agc tag       1629
Arg Thr Ala Gln Asp Ala Ala Ala Ala Ala Ala Tyr Gly Ser  *
    530                 535                 540
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<210> 33
<211> 542
<212> PRT
<213> Zea mays

<400> 33

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 1               5                  10                  15
Val Leu Ser Leu Cys Ser Pro Tyr Lys Phe Ile Gln Ser Pro Met Asp
            20                  25                  30
Leu Gly Pro Leu Asn Leu Leu Pro Thr Thr Ser Thr Ala Ala Ala Ser
        35                  40                  45
Ser Asp Phe Gly Arg Ile Leu Phe Arg Ala Pro Ala Ala Val Leu Arg
    50                  55                  60
Pro Gln Ser Pro Arg Asp Ile Ser Met Leu Leu Ser Phe Leu Ser Gly
65                  70                  75                  80
Ser Pro Ser Leu Ser Arg Val Thr Val Ala Ala Arg Gly Ala Gly His
                85                  90                  95
Ser Ile His Gly Gln Ala Gln Ala Pro Asp Gly Ile Val Val Glu Thr
            100                 105                 110
Arg Ser Leu Pro Gly Glu Met Glu Phe His His Val Arg Gly Gly Gly
        115                 120                 125
Glu Gly Arg Ala Ser Tyr Ala Asp Val Gly Gly Gly Val Leu Trp Ile
    130                 135                 140
Glu Leu Leu Glu Arg Ser Leu Lys Leu Gly Leu Ala Pro Arg Ser Trp
145                 150                 155                 160
Thr Asp Tyr Leu Tyr Leu Thr Val Gly Gly Thr Leu Ser Asn Ala Gly
                165                 170                 175
Ile Ser Gly Gln Thr Phe Lys His Gly Pro Gln Ile Ser Asn Val Leu
            180                 185                 190
Gln Leu Glu Val Val Thr Gly Arg Gly Glu Ile Val Glu Cys Ser Pro
        195                 200                 205
Ser Lys Glu Ala Asp Leu Phe Asn Ala Val Leu Gly Gly Leu Gly Gln
    210                 215                 220
Phe Gly Ile Ile Thr Arg Ala Arg Ile Leu Leu Gln Glu Ala Pro Glu
225                 230                 235                 240
Lys Val Thr Trp Val Arg Ala Phe Tyr Asp Asp Leu Gly Ala Phe Thr
                245                 250                 255
Arg Asp Gln Glu Leu Leu Val Ser Ile Pro Asp Ser Val Asp Tyr Val
            260                 265                 270
Glu Gly Phe Met Val Leu Asn Glu Arg Ser Leu His Ser Ser Ser Ile
        275                 280                 285
Ala Phe Pro Ala Ser Val Asp Phe Ser Pro Asp Phe Gly Thr Arg Ser
    290                 295                 300
Ser Pro Arg Ile Tyr Tyr Cys Val Glu Phe Ala Val His His His His
305                 310                 315                 320
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```
Gly Tyr Gln Gln Gln Ser Gln Ala Ala Val Glu Ala Ile Ser Arg Arg
                325                 330                 335
Met Ser His Met Ala Ser Gln Leu Tyr Ser Val Glu Val Ser Tyr Leu
            340                 345                 350
Asp Phe Leu Asn Arg Val Arg Met Glu Glu Val Ser Leu Arg Ser Ala
        355                 360                 365
Gly Met Trp Glu Glu Val His His Pro Trp Leu Asn Met Phe Val Pro
    370                 375                 380
Lys Ala Gly Val Ala Gly Phe Arg Asp Leu Leu Met Asp Asn Val Ser
385                 390                 395                 400
Pro Asp Ser Phe Gln Gly Leu Ile Leu Ile Tyr Pro Leu Leu Arg Asp
                405                 410                 415
Lys Trp Asp Thr Asn Thr Ser Val Val Ile Pro Asp Ser Gly Pro Thr
            420                 425                 430
Ala Asp Asp Pro Val Met Tyr Val Val Gly Ile Leu Arg Ser Ala Asn
        435                 440                 445
Pro Gly Pro Glu Glu Asp Gly Asp Gly Cys Ser His Arg Cys Leu His
    450                 455                 460
Glu Leu Leu Arg Ser His Arg Arg Ile Ala Asp Ala Ala Glu Ala Arg
465                 470                 475                 480
Leu Gly Ala Lys Gln Tyr Leu Pro His His Pro Thr Pro Ala Arg Trp
                485                 490                 495
Gln Gln His Leu Gly Arg Arg Trp Glu Arg Phe Ala Asp Arg Lys Ala
            500                 505                 510
Arg Phe Asp Pro Leu Arg Ile Leu Gly Pro Gly Gln Gly Ile Phe Pro
        515                 520                 525
Arg Thr Ala Gln Asp Ala Ala Ala Ala Ala Ala Tyr Gly Ser
    530                 535                 540
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<211> 3003
<212> DNA
<213> Zea mays

<220>
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<222> (0)...(0)
<223> ZmCkx2 promoter

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cggcgaaaat gtccagaagg ccacgtgggg catgggtccc cggagtccac ttccgcgcga 180
tctcgaggcc gggccgcacc ggcaatcgct ctccggccac ctccctgctt cctcaggtcc 240
ggtctcccat agtccaatgc atgcatgcac gagcatcccc tcagaacgct ggcagtgagt 300
gtcttgctcg cacatcagct tggccagtca gtgcgagaac acagcagcaa caacaacaac 360
aacacctgtg cacaatggcg tctatcattg gtaccatctc aatcggctga cttgtctata 420
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agcgcctcat tattatcatc attctcttaa actggtcaga aaactgacca tcagctaaag 540
tgatactgac atactgtatc tttgtagata attaaatgga gaaaaatctc cttctgttcc 600
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ctctctctct ctctctctgc cttctgattc caagctcccc aactgcccag caccaacctg 2940
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acc 3003

<210> 35
<211> 2001
<212> DNA
<213> Zea mays

<220>
<221> misc_feature
<222> (0)...(0)
<223> Promoter for ZmCkx3

<221> misc_feature
<222> (0)...(0)
<223> n = A, T, C, or G

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ggggaggtgc ccgccactaa cctctcggtc ggatatatta gtattcaagc agttgacaaa 300
tctgtgcgga tttgatttgg tctgaggaaa atatatatat atatatatat agcccctcgt 360
cgttcatgca ccctctcgca gcctgcaacc ttacaatatt gttcttgcat ccggttttat 420
ttatattttt atttttaaa aaaaaaatcc atagtcctgc cgtcttgaag gatatgtttt 480

tctttaccca tgcacggcgg agtttaaatt tgcgctgacc cgactgctcg tgaacagaga 540
caagtatgac agatatcgtt gagttccaaa ttttaaaaaa aaaatcaata aaaaatttaa 600
aacagaatgt tgacgaggaa aaaaaatatg aaggtgcttg cacacctgtc actccatgcc 660
ggacatcaac aaattaattg ttcaagtggt gggagtcagc tgcttccagt ttaccttcct 720
gcgccagcgg ttggtagaca ggattgttgc cacgtggacg aaatctcctg ccgccagctg 780
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ttgcgttgcc gcaagacaag c 2001

<210> 36
<211> 2448
<212> DNA
<213> Zea mays

<220>
<221> misc_feature
<222> (0)...(0)
<223> promoter for ZmCkx4

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tgatgtgtga gacgttcaag gaagtgaact attggaggag tcgactaaaa gtacgattaa 180
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gttctcaact agggcctaaa attctcaaaa tatctgttgg ggaccattat cgtcgacgat 480
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tctgcgtaga gcgtgccgga ggaggaagct ttggctctga atgcatcgac ttacgaagca 660
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<210> 37
<211> 2346
<212> DNA
<213> Zea mays

<220>
<221> misc_feature
<222> (0)...(0)
<223> promoter for ZmCkx5

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gcaaccccat ttcaattcac atgcttgtct ttccaaggaa ctttctaagc cacctaacag 360
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